SAMSUNG

ELECTRONICS

Preliminary

LEAD-FREE

TO   : General

DATE   : July.10 2009

SAMSUNG TFT-LCD
MODEL NO. : LTN121AT06-L02

NOTE :
- Extension code [**L02**]
- Surface type [**Glare**]

The information described in this SPEC is preliminary and can be changed without prior notice.

APPROVED BY :   *Je-Hwan Oh*

PREPARED BY : **TCS Team , Application Engineering Part**

SAMSUNG ELECTRONICS CO., LTD.

wise view™

| Doc.No. | LTN121AT06-L02 | Rev.No | 04-P00-G-090710 | Page | 1 / 27 |

Preliminary

CONTENTS

Samsung Secret

| Doc.No. | LTN121AT06-L02 | Rev.No | 04-P00-G-090710 | Page | 2 / 27 |

REVISION HISTORY

Preliminary

Date	Revision No.	Page	Summary
July.10. 2009	P00	All	LTN121AT06-L02 model spec was issued first. (This model will be provided through Line 6)

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	3 / 27

Preliminary

GENERAL DESCRIPTION

DESCRIPTION

LTN121AT06 is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as switching devices. This model is composed of a TFT LCD panel, a driver circuit and a backlight unit. The resolution of a 12.1" contains 1280 x 800 pixels and can display up to 262,144 colors. 6 O'clock direction is the optimum viewing angle.

FEATURES

- High contrast ratio
- WXGA (1280 x 800 pixels) resolution
- Low power consumption
- Fast Response
- LED Back Light with embedded LED Driver
- DE (Data enable) only mode
- 3.3V LVDS Interface
- Onboard EEDID chip
- Green product (RoHS compliant)

APPLICATIONS

- Notebook PC
- If the usage of this product is not for PC application, but for others, please contact SEC

GENERAL INFORMATION

Item	Specification	Unit	Note
Display area	261.12(H) x 163.2(V) (12.1" wide diagonal)	mm	
Driver element	a-Si TFT active matrix		
Display colors	262,144		
Number of pixel	1280 x 800	pixel	
Pixel arrangement	RGB vertical stripe		
Pixel pitch	0.204(H) x 0.204(V) (TYP.)	mm	
Display Mode	Normally white		
Surface treatment	Haze 0, Hard-Coating 3H		Glare

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	4 / 27

Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal (H)	275.3	275.8	276.3	mm	
	Vertical (V)	177.6	178.1	178.6	mm	
	Depth (D)	-	5.2	5.5	mm	(1)
Weight		-	278	295	g	

Note (1) Measurement condition of outline dimension
. Equipment : Bernier Calipers
. Push Force : 500g ·f (minimum)

1. ABSOLUTE MAXIMUM RATINGS

1.1 ENVIRONMENTAL ABSOLUTE RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Storage temperate	TSTG	-20	60	°C	(1)
Operating temperate (Temperature of glass surface)	TOPR	0	50	°C	(1)
Shock (non-operating)	Snop	-	240	G	(2),(4)
Vibration (non-operating)	Vnop	-	2.41	G	(3),(4)

Note (1) Temperature and relative humidity range are shown in the figure below.
95 % RH Max. (40 °C $\geq$ Ta)
Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation

Relative Humidity (%RH)

- (40,90)
- Operating Range
- (50,50.4)
- (60,27.7)
- Storage Range

Temperature (^{O}C)
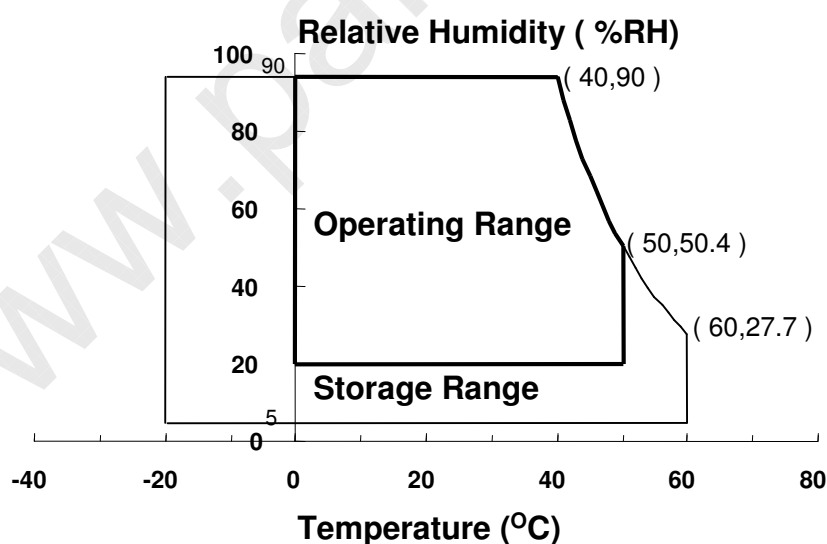
(2) 2ms, half sine wave, one time for ±X, ±Y, ± Z.
(3) 5 - 500 Hz, random vibration, 30min for X, Y, Z.
(4) At testing Vibration and Shock, the fixture in holding the Module to be tested have to be hard and rigid enough so that the Module would not be twisted or bent by the fixture.

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	5 / 27

1.2 ELECTRICAL ABSOLUTE RATINGS

(1) TFT LCD MODULE

V_{DD} =3.3V, V_{SS} = GND = 0V

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	V_{DD} - 0.3	V_{DD} + 0.3	V	(1)
Logic Input Voltage	V_{IN}	V_{DD} - 0.3	V_{DD} + 0.3	V	(1)

Note (1) Within Ta (25 ± 2 ℃)

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	6 / 27

2. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (5). Measuring equipment : TOPCON SR-3

$* \ Ta = \ 25 \pm 2 \ °C, \ V_{DD}=3.3V, \ fv= 60Hz, f_{DCLK} = 69.3MHz, IF = 18.0 \ mA$

Item		Symbol	Condition	Min.	Typ.	Max	Unit	Note
Contrast Ratio (5 Points)		CR		400	500	-	-	(1), (2), (5)
Response Time at Ta (Rising + Falling)		T_{RT}		-	25	35	msec	(1), (3)
Average Luminance of White (5 Points)		$Y_{L,AVE}$		170	200	-	cd/m^2	IF=18.0mA (1), (4)
Color Chromaticity (CIE)	Red	R_X	Normal Viewing Angle $\phi = 0$ $\theta = 0$	0.536	0.566	0.596	-	(1), (5) SR-3
		R_Y		0.307	0.337	0.367		
	Green	G_X		0.321	0.351	0.381		
		G_Y		0.530	0.560	0.590		
	Blue	B_X		0.120	0.150	0.180		
		B_Y		0.064	0.094	0.124		
	White	W_X		0.283	0.313	0.343		
		W_Y		0.299	0.329	0.359		
Viewing Angle	Hor.	θ_L	CR ≥ 10 At center	30	45		Degrees	(1), (5) SR-3
		θ_H		30	45			
	Ver.	ϕ_H		10	20			
		ϕ_L		20	30			
13 Points White Variation		δ_L		-	1.4	1.6	-	(6)

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	7　/ 27

Note 1) Definition of Viewing Angle : Viewing angle range($10 \leq C/R$)

Normal Line
$\phi = 0^o, \theta = 0^o$

θ_L

θ_R

ϕ_L ϕ_H

$\theta_L = 90^o$ x

12 O'clock direction
$\phi_H = 90^o$

y

6 O'clock direction
$\phi_L = 90^o$ y'

x'

$\theta_R = 90^o$
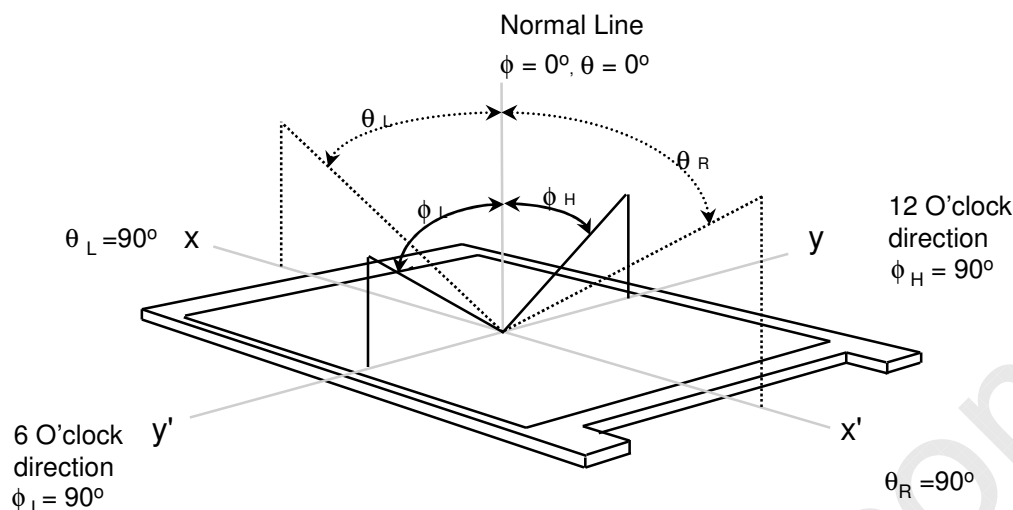
Note 2) Definition of Contrast Ratio (CR) : Ratio of gray max (Gmax) ,gray min (Gmin) at 5 points(4, 5, 7, 9, 10)

$$CR = \frac{CR(4) + CR(5) + CR(7) + CR(9) + CR(10)}{5}$$

Points : ④ , ⑤ , ⑦ , ⑨ , ⑩   at the figure of Note (6).

Note 3) Definition of Response time :

Display data   White(TFT OFF)   Black(TFT ON)   White(TFT OFF)

T_R T_F

100%
90%

Optical Response

10%
0%

Time
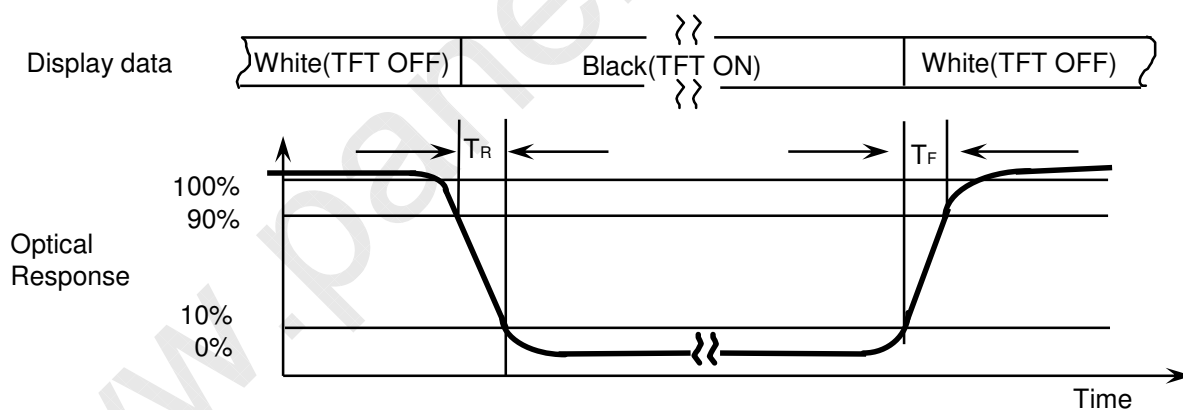
Note 4) Definition of Average Luminance of White : measure the luminance of white at 5 points.

320   640   960

VIEW AREA

Average Luminance of White ($Y_{L,AVE}$)

$$Y_{L,AVE} = \frac{Y_{L4} + Y_{L5} + Y_{L7} + Y_{L9} + Y_{L10}}{5}$$

⑩   ⑨   200

⑦   400

⑤   ④   600 (lines)

◯ : test point
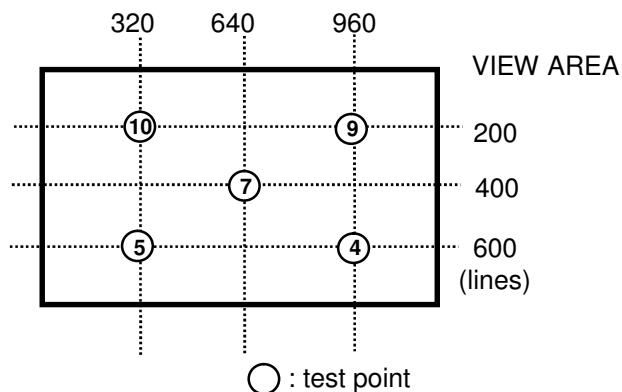
Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	8 / 27

Note 5) After stabilizing and leaving the panel alone at a given temperature for 30 min , the measurement should be executed. Measurement should be executed in a stable, windless,and dark room.
30 min after lighting the backlight. This should be measured in the center of screen.
IF current : 19.0mA
Environment condition : Ta = 25 ± 2 °C

Photo-detector
(TOPCON SR-3)

Field = 2°

50 cm

TFT-LCD module

LCD panel

Center of the screen

[Optical characteristics measurement setup]
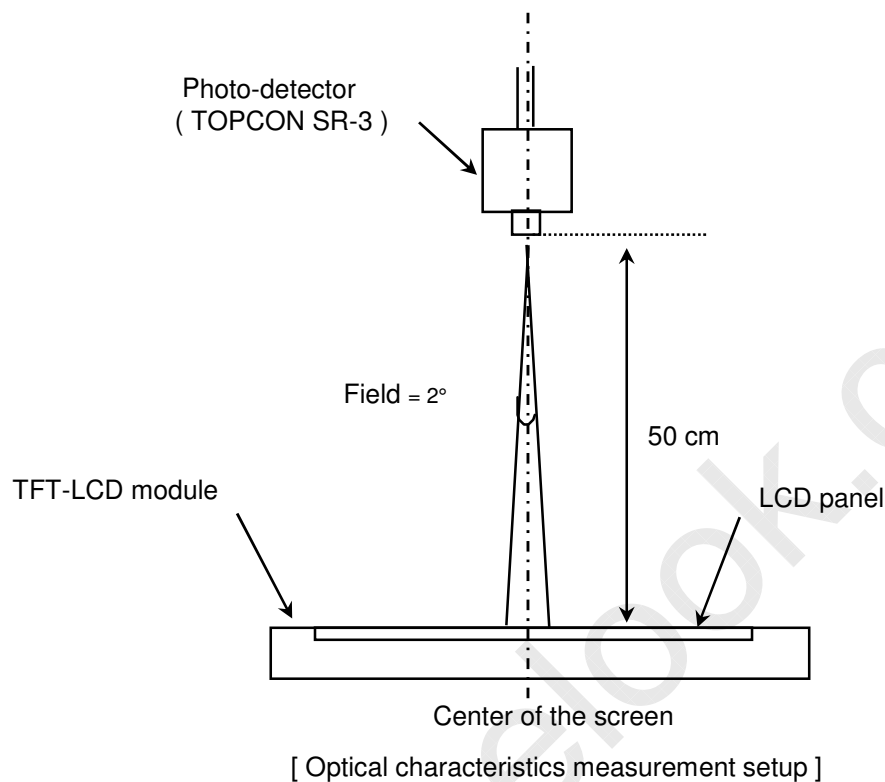
Note 6) Definition of 13 points white variation (δ L), CR variation(CVER) [① ~ ⑬]

$$\delta_L = \frac{\text{Maximum luminance of 13 points}}{\text{Minimum luminance of 13 points}}$$

10mm   10mm
320   640   960
10mm

13   12   11
10   9   200
8   7   6   400   ○ : test point
5   4   600
3   2   1   (lines)

10mm
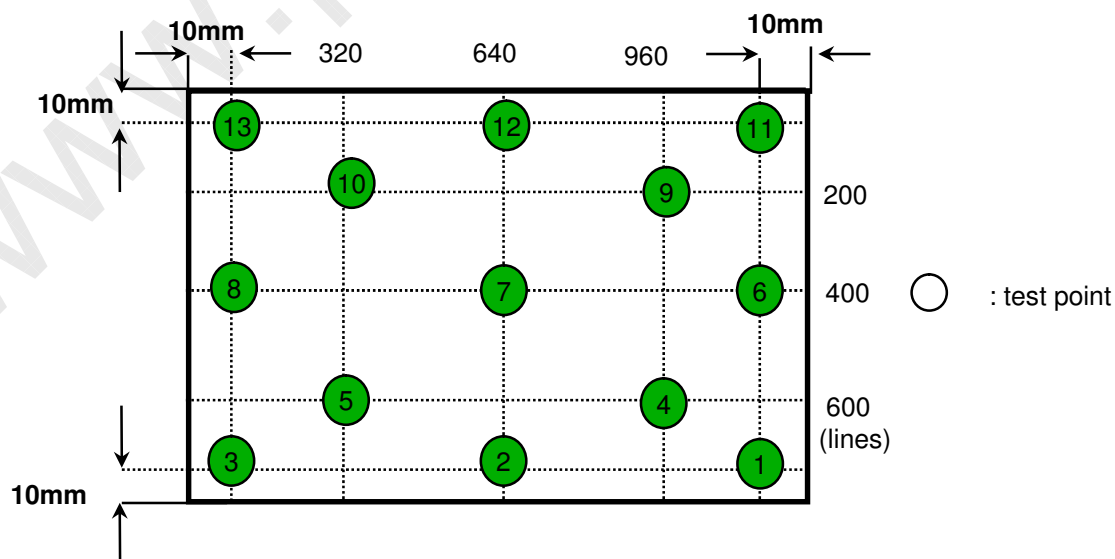
Samsung Secret

| **Doc.No.** | LTN121AT06-L02 | **Rev.No** | 04-P00-G-090710 | **Page** | 9 / 27 |

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

Ta= 25 ± 2°C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	3.0	3.3	3.6	V	
Differential Input Voltage for LVDS Receiver Threshold	High	V_{IH}	-	-	+100	mV	V_{CM} = +1.2V
	Low	V_{IL}	-100	-	-	mV	
Vsync Frequency		f_V	-	60	-	Hz	
Hsync Frequency		f_H	-	51.2	-	KHz	
Main Frequency		f_{DCLK}	67.2	69.3	70.6	MHz	
Rush Current		I_{RUSH}	-	-	1.5	A	(4)
Current of Power Supply	White	I_{DD}	-	220	-	mA	(2),(3)*a
	Mosaic		-	240	-	mA	(2),(3)*b
	V. stripe		-	280	320	mA	(2),(3)*c

Note (1) Display data pins and timing signal pins should be connected.(GND = 0V)

(2) f_V = 60Hz, f_{DCLK} = 69.3MHZ, V_{DD} = 3.3V , DC Current.

(3) Power dissipation pattern

*a) White Pattern   *b) Mosaic Pattern

VIEW AREA
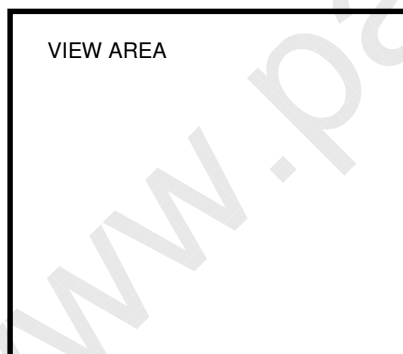
Display Brightest Gray Level

Display Darkest Gray Level
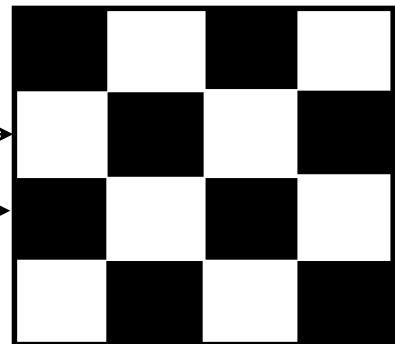
Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	10 / 27

Preliminary

*c) 1dot Vertical stripe pattern

R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
R	G	B	R	G	B	R	G	B	R	G
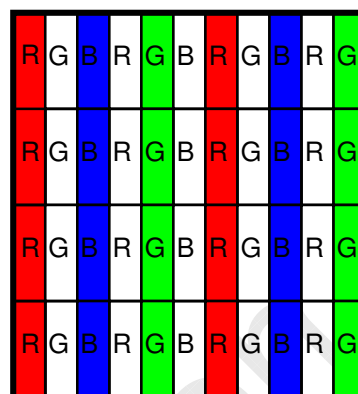
4) Rush current measurement condition

3.3V

M1
2SK1059

FUSE

C1
1uF

V$_{DD}$ (LCD INPUT)

R1
47K

CONTROL SIGNAL
(HIGH to LOW)

R2
1K

M2
2SK1399

12V

R3
47K

C3
1uF

C2
10000pF
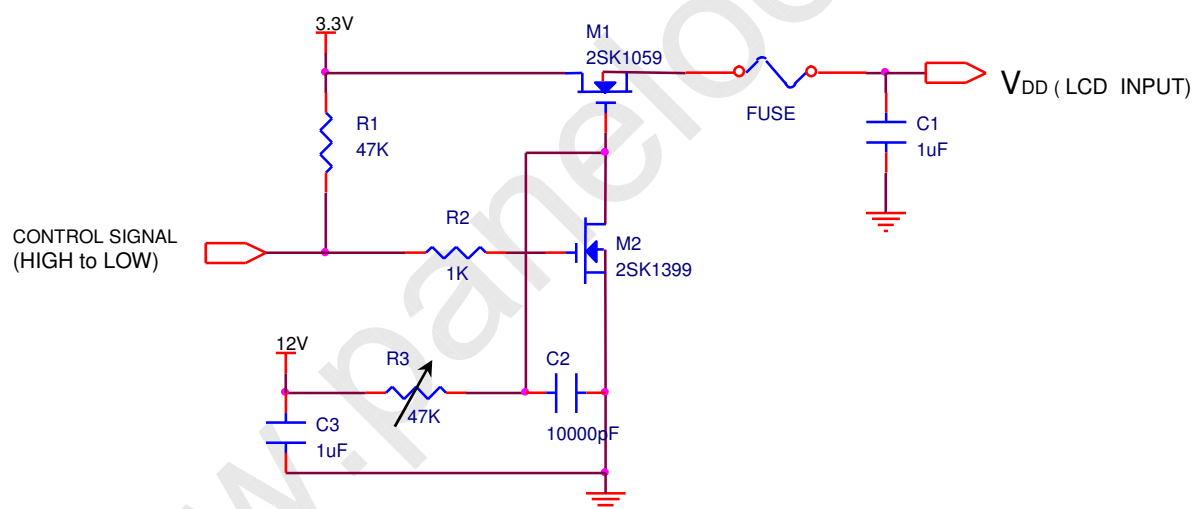
V$_{DD}$ rising time is 470us

0.9V$_{DD}$　　3.3V

0.1V$_{DD}$

GND

470us
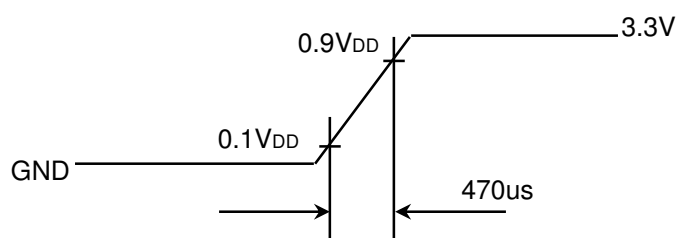
Samsung Secret

| **Doc.No.** | LTN121AT06-L02 | **Rev.No** | 04-P00-G-090710 | **Page** | 11 / 27 |

3.2 BACK-LIGHT UNIT

Ta= 25 ± 2 ℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Forward Current	IF	-	18	-	mA	
LED Forward Voltage	VF	-	3.2	-	V	
LED Array Voltage	VP	-	25.6	-	V	VF X 8 LEDs
Power Consumption	P	-	2.3	-	W	IF X VF X 40LEDs
Operating Life Time	Hr	10,000	-	-	Hour	(1)

Note (1) Life time (Hr) of LEDs can be defined as the time in which it continues to operate under the
condition Ta= 25 ± 2 ℃ and IF = 19.0 mArms until one of the following event occurs.
1. When the brightness becomes 50% or lower than the original.

3.3 LED Driver

- On board LED Driver (Manufacturer : SEC)

Ta= 25 ± 2 ℃

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage	V_{in}	6	12	20	V	
Input Current	I	-		-	mA	
Input Power	P_{in}	-	2.6	2.8	W	
Operating Frequency	F_o	0.8	1.0	1.2	MHz	
Burst Ratio	D	10	-	100	%	
External PWM Dimming Control Frequency (BLIM)	F_{BLIM}	0.2	-	20	kHz	Vin=7~20V, BLIM=PWM 0V~3.3V

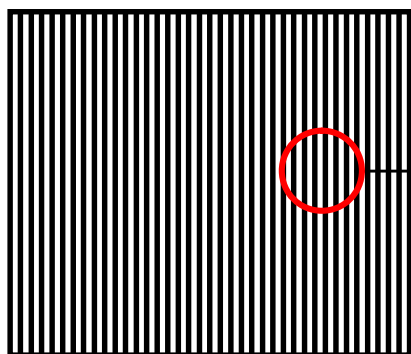Note - Test Equipment : Fluke 45

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	12 / 27

Preliminary

4. BLOCK DIAGRAM

4.1 TFT LCD Module

Signal Legend:
- Video Signal
- Control Signal
- VCOM
- LED Power&signal
- DVDD
- AVDD
- Von/Voff
- Gamma
- Feedback

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	13 / 27
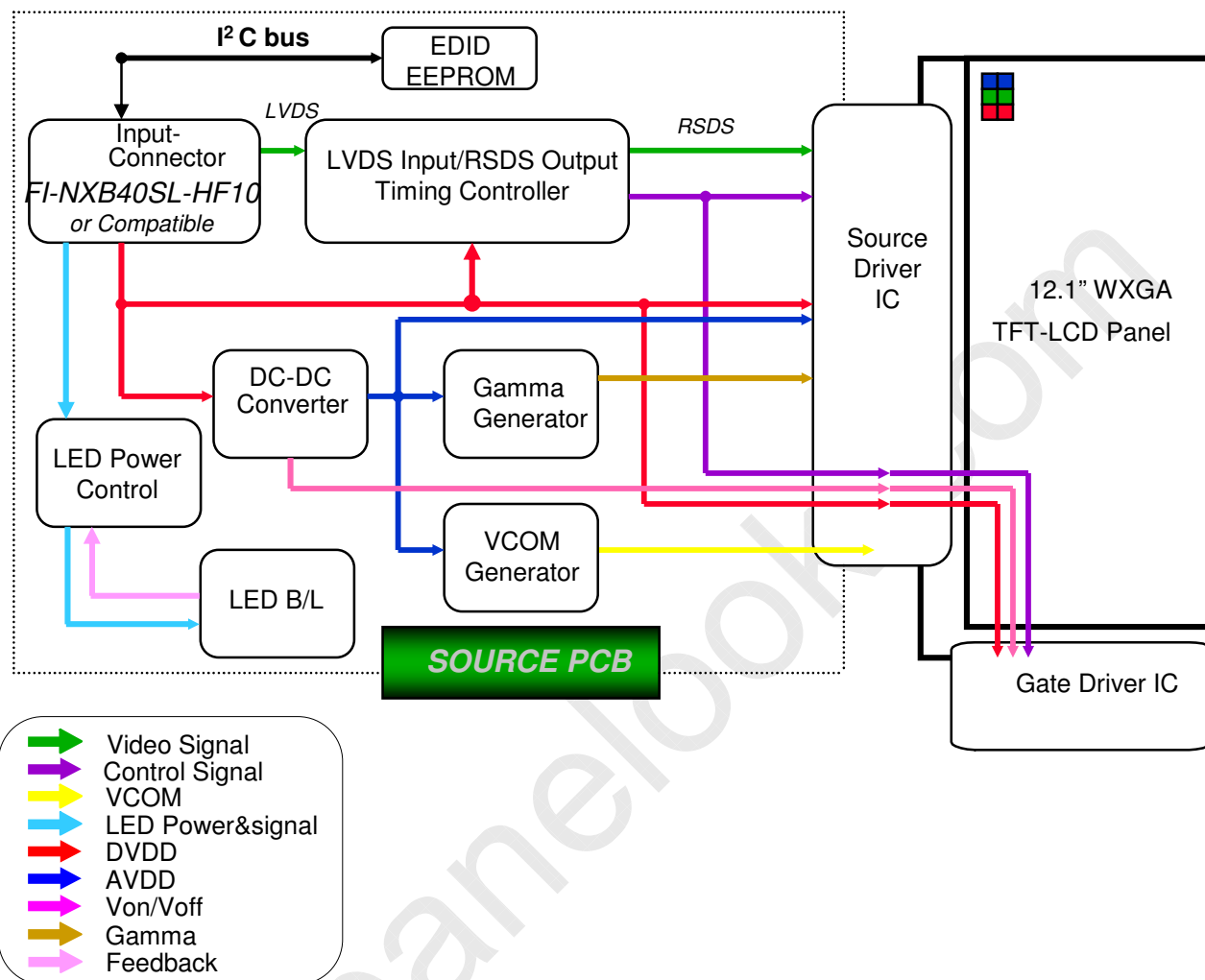
5. INPUT TERMINAL PIN ASSIGNMENT

5.1. Input Signal & Power (LVDS, Connector : TBD)

No.	Symbol	Function	Polarity	Remarks
1	NC	No Connection		
2	AVDD	Power Supply 3.3V (typical)		
3	AVDD	Power Supply 3.3V (typical)		
4	DVDD	DDC 3.3V power		
5	NC	No Connection		
6	SCL	DDC Clock		
7	SDA	DDC data		
8	RIN0-	LVDS differential data input (R0-R5, G0)	Negative	
9	RIN0+	LVDS differential data input (R0-R5, G0)	Positive	
10	GND	Ground		
11	RIN1-	LVDS differential data input (G1-G5, B0-B1)	Negative	
12	RIN1+	LVDS differential data input (G1-G5, B0-B1)	Positive	
13	GND	Ground		
14	RIN2-	LVDS differential data input (B2-B5, HS, VS, DE)	Negative	
15	RIN2+	LVDS differential data input (B2-B5, HS, VS, DE)	Positive	
16	GND	Ground		
17	CLK-	LVDS differential clock input	Negative	
18	CLK+	LVDS differential clock input	Positive	
19	GND	Ground		
20~21	NC	No Connection		
22	GND	Ground		
23~24	NC	No Connection		
25	GND	Ground		
26~27	NC	No Connection		
28	GND	Ground		
29~30	NC	No Connection		
31~33	VBL-	LED Power return		
34	NC	No Connection		
35~37	VBL+	7V – 20V LED power		
38	BLIM	PWM for luminance control (200~1KHz, 3.3V)		
39	BL_Enable	BL On/Off (On: 2.0~3.3V, Off: 0~0.5V)		
40	NC	No Connection		

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	14 / 27

5.2 LVDS Interface : Transmitter DS90CF363 or Compatible

Pin No.	Name	RGB Signal	Pin No.	Name	RGB Signal
51	TxIN0	R0	14	TxIN14	G5
52	TxIN1	R1	15	TxIN15	B0
54	TxIN2	R2	19	TxIN18	B1
55	TxIN3	R3	20	TxIN19	B2
56	TxIN4	R4	22	TxIN20	B3
3	TxIN6	R5	23	TxIN21	B4
4	TxIN7	G0	24	TxIN22	B5
6	TxIN8	G1	27	TxIN24	Hsync
7	TxIN9	G2	28	TxIN25	Vsync
11	TxIN12	G3	30	TxIN26	DE
12	TxIN13	G4	31	TxCLKIN	Clock

LVDS INTERFACE
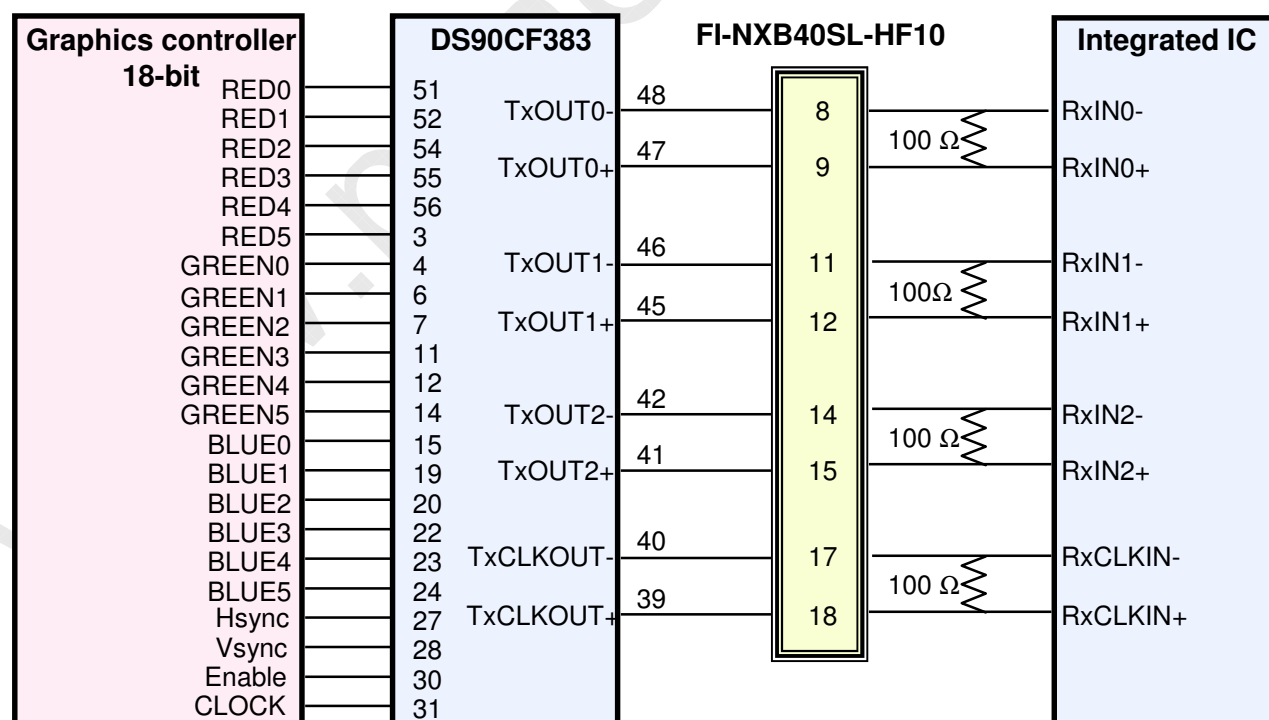
Note : The LCD Module uses a 100ohm resistor between positive and negative lines of each receiver input.

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	15 / 27

Preliminary

5.3 Timing Diagrams of LVDS For Transmission

LVDS Receiver : Integrated T-CON
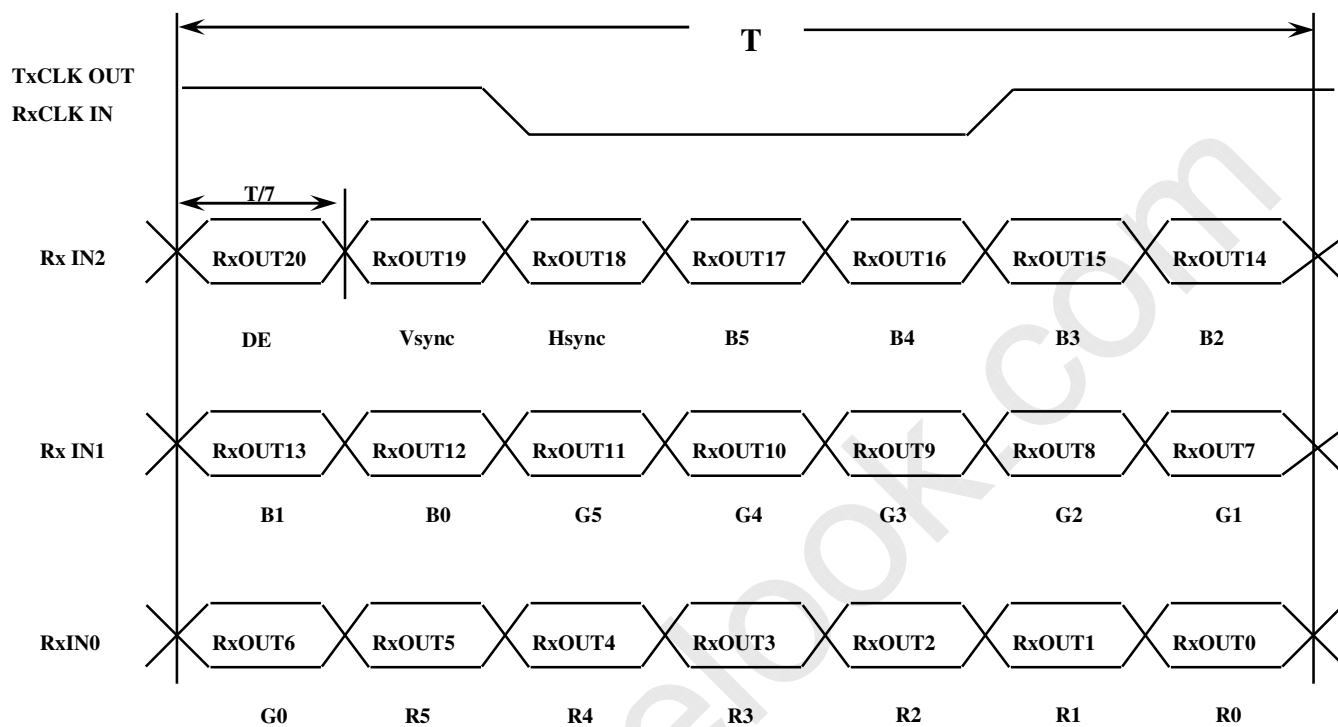
Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	16 / 27

Preliminary

5.4 Input Signals, Basic Display Colors and Gray Scale of Each Color

Color	Display	Data Signal																		Gray Scale Level
		Red						Green						Blue						
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	45	B5	
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	-
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	-
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	-
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	-
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	-
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
Gray Scale Of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	Dark	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
	↑	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	R3~R60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R61
	Light	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R62
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	R63
Gray Scale Of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	Dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	G1
	↑	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	G2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	G3~G60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	G61
	Light	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	G62
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	G63
Gray Scale Of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	B1
	↑	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	B2
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	B3~B60
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	↓	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	B61
	Light	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	B62
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	B63

Note 1) Definition of gray :
　　Rn: Red gray, Gn: Green gray, Bn: Blue gray (n=gray level)
Note 2) Input signal: 0 =Low level voltage, 1=High level voltage

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	17 / 27

Preliminary

5.5　Pixel Format in the display

1　　　　　　　　　　　　　　　　　　　　　　1280

Line 1　R G B　R G B　　　　　　　　　　　　R G B　R G B

LTN121AT06-L02 Panel

Line 800　R G B　R G B　　　　　　　　　　R G B　R G B

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	18 / 27
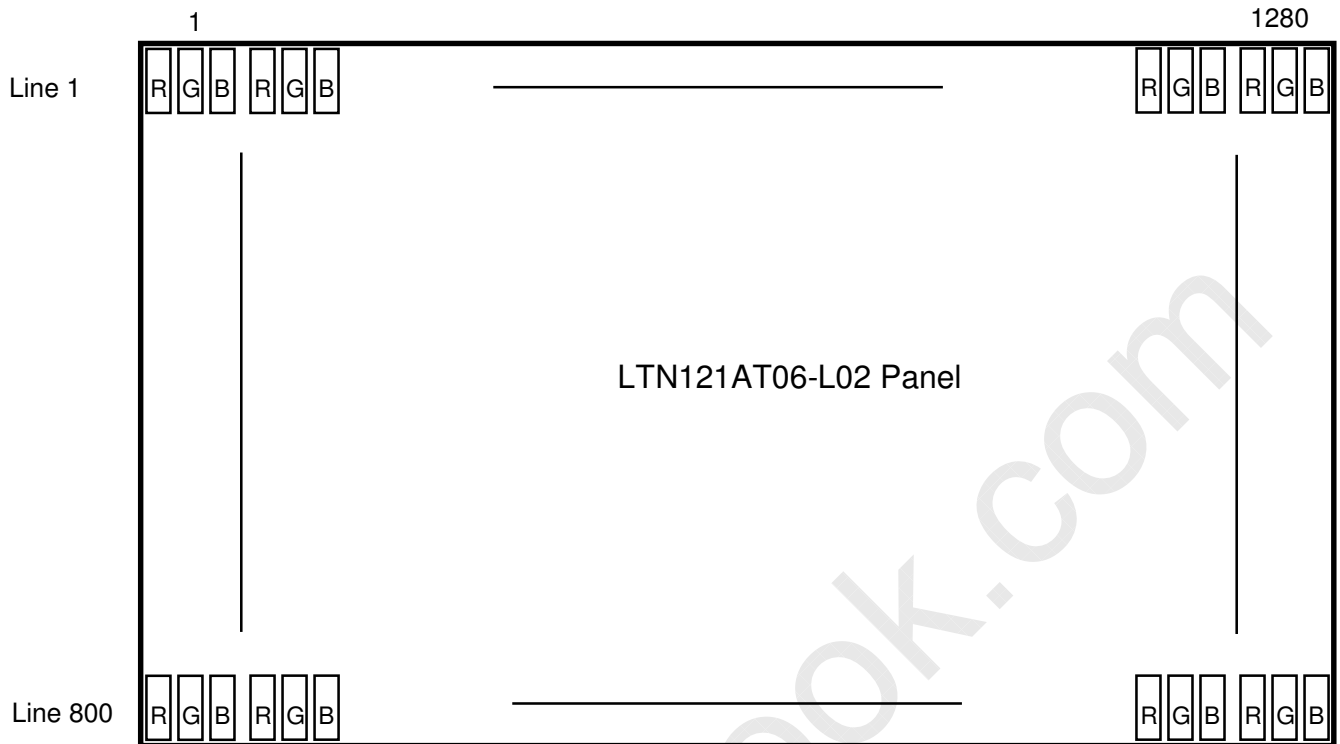
6. INTERFACE TIMING

6.1 Timing Parameters

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
Frame Frequency	Cycle	TV	804	816	860	Lines	
Vertical Active Display Term	Display Period	TVD	-	800	-	Lines	
One Line Scanning Time	Cycle	TH	1350	1415	1460	Clocks	
Horizontal Active Display Term	Display Period	THD	-	1280	-	Clocks	

6.2 Timing diagrams of interface signal

DE

T_V

T_{VD}

T_H

DCLK

T_C

DE

T_{HD}

DATA SIGNALS   Valid display data (1280 clocks)

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	19 / 27
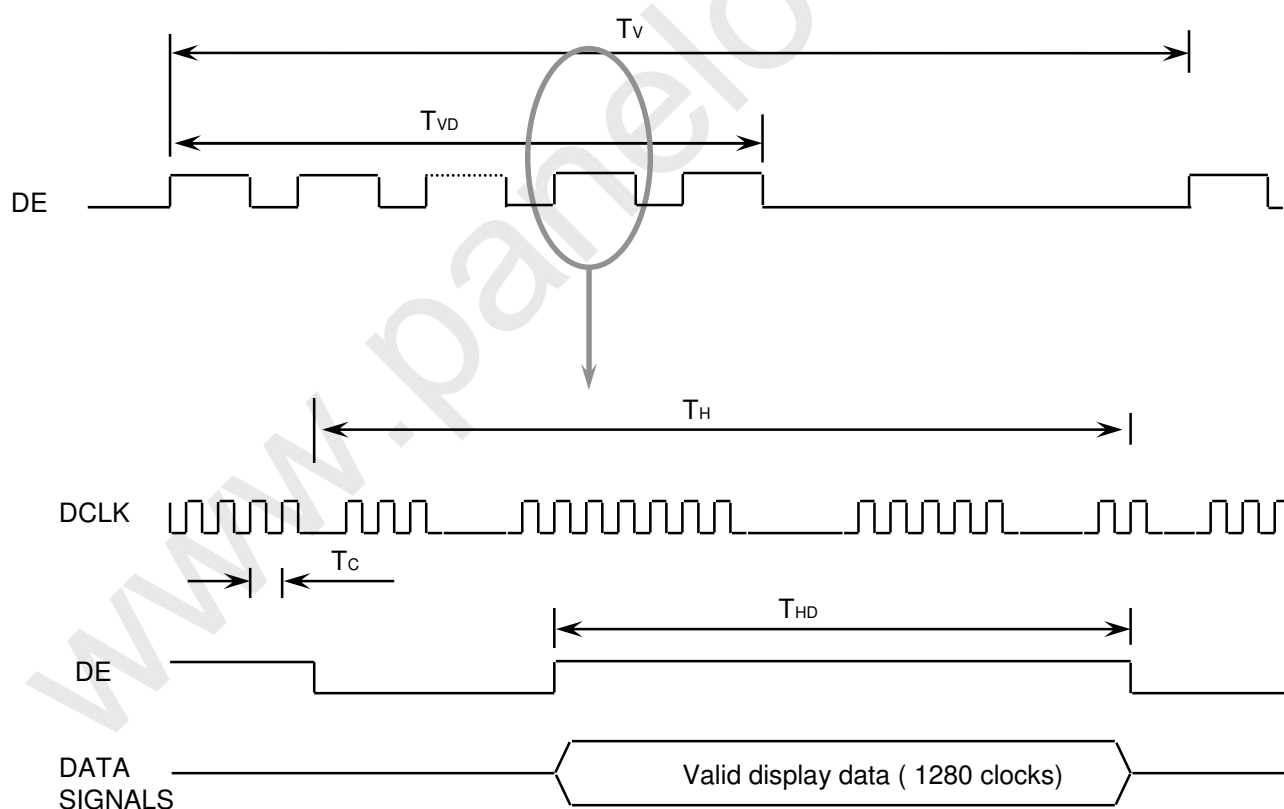
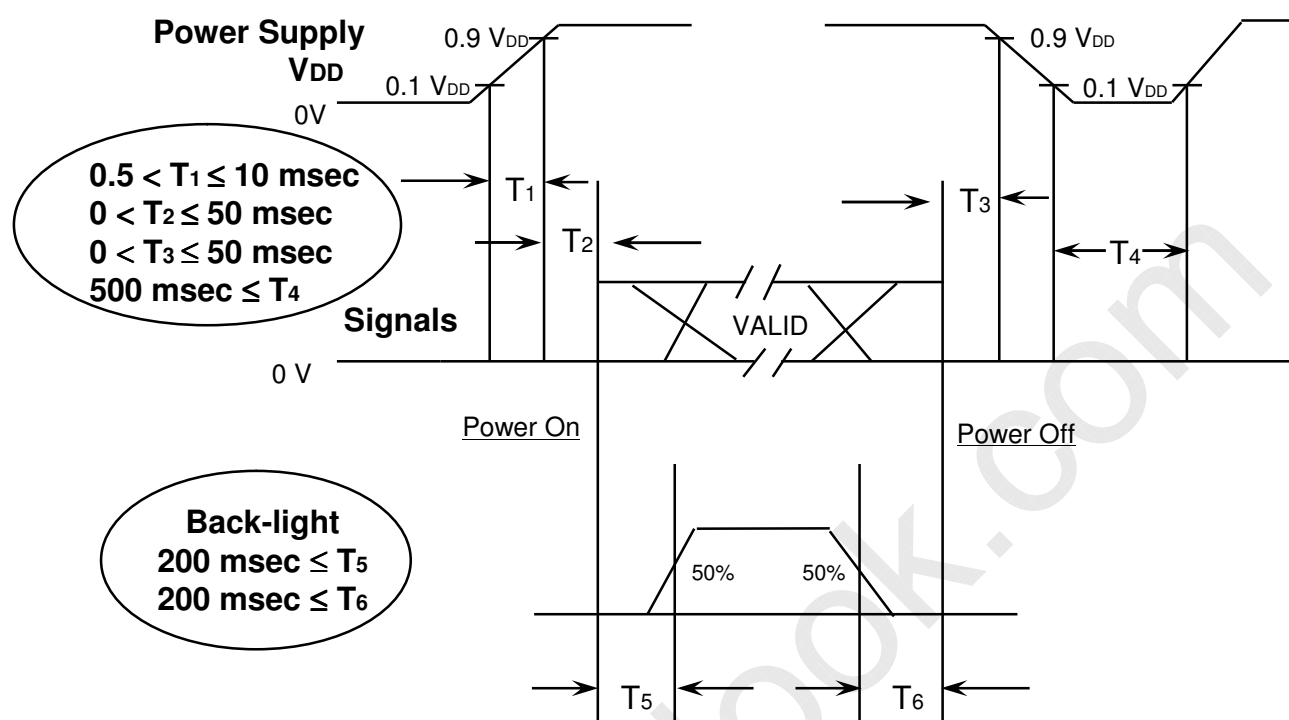### 6.3 Power ON/OFF Sequence

: To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.

Power Supply V$_{DD}$

0.9 V$_{DD}$　　　0.9 V$_{DD}$

0.1 V$_{DD}$　　　0.1 V$_{DD}$

0V

$0.5 < T_1 \le 10$ msec
$0 < T_2 \le 50$ msec
$0 < T_3 \le 50$ msec
500 msec $\le T_4$

T_1　　T_3

T_2　　T_4

Signals

VALID

0 V

Power On　　　Power Off

Back-light
200 msec $\le T_5$
200 msec $\le T_6$

50%　　50%

T_5　　T_6

Power ON/OFF Sequence

T1 : Vdd rising time from 10% to 90%
T2 : The time from Vdd to valid data at power ON.
T3 : The time from valid data off to Vdd off at power Off.
T4 : Vdd off time for Windows restart
T5 : The time from valid data to B/L enable at power ON.
T6 : The time from valid data off to B/L disable at power Off.

NOTE.

(1) The supply voltage of the external system for the module input should be the same as the definition of V$_{DD}$.

(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

(3) In case of V$_{DD}$ = off level, please keep the level of input signals on the low or keep a high impedance.

(4) T4 should be measured after the module has been fully discharged between power off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

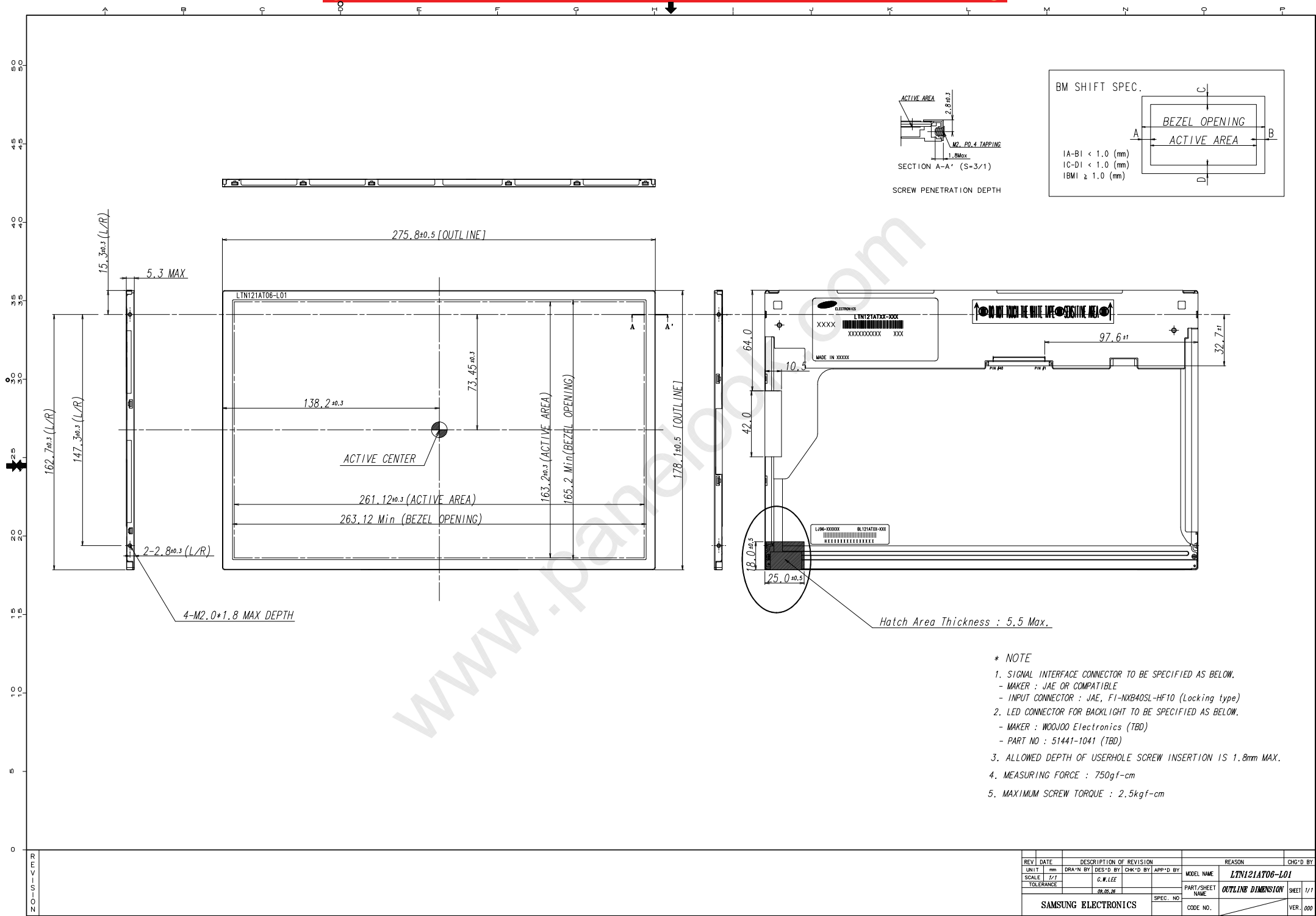| **Doc.No.**	LTN121AT06-L02	**Rev.No**	04-P00-G-090710	**Page**	20 / 27

7. Mechanical Outline Dimension

Preliminary

　Refer to the next page

Samsung Secret

| **Doc.No.** | LTN121AT06-L02 | **Rev.No** | 04-P00-G-090710 | **Page** | 21 / 27 |

ACTIVE AREA
2.8±0.3

M2, P0.4 TAPPING
1.8Max

SECTION A-A' (S=3/1)

SCREW PENETRATION DEPTH

BM SHIFT SPEC.

C

BEZEL OPENING
ACTIVE AREA

A   B

D

IA-BI < 1.0 (mm)
IC-DI < 1.0 (mm)
IBMI ≥ 1.0 (mm)

275.8±0.5 [OUTLINE]

15.3±0.3 (L/R)

5.3 MAX

LTN121AT06-L01

162.7±0.3 (L/R)
147.3±0.3 (L/R)

73.45±0.3

138.2±0.3

ACTIVE CENTER

163.2±0.3 (ACTIVE AREA)
165.2 Min(BEZEL OPENING)

178.1±0.5 [OUTLINE]

A   A'

261.12±0.3 (ACTIVE AREA)
263.12 Min (BEZEL OPENING)

2-2.8±0.3 (L/R)

4-M2.0*1.8 MAX DEPTH

ELECTRONICS
LTN121ATXX-XXX
XXXX
XXXXXXXXXX   XXX

MADE IN XXXXX

DO NOT TOUCH THE WHITE TAPE SENSITIVE AREA

97.6±1

32.7±1

64.0
10.5
42.0

PIN #40   PIN #1

LJ96-XXXXXX   BL121ATXX-XXX
XXXXXXXXXXXXXXXXX

8.0±0.5
25.0±0.5

Hatch Area Thickness : 5.5 Max.

* NOTE
1. SIGNAL INTERFACE CONNECTOR TO BE SPECIFIED AS BELOW.
  - MAKER : JAE OR COMPATIBLE
  - INPUT CONNECTOR : JAE, FI-NXB40SL-HF10 (Locking type)
2. LED CONNECTOR FOR BACKLIGHT TO BE SPECIFIED AS BELOW.
  - MAKER : WOOJOO Electronics (TBD)
  - PART NO : 51441-1041 (TBD)
3. ALLOWED DEPTH OF USERHOLE SCREW INSERTION IS 1.8mm MAX.
4. MEASURING FORCE : 750gf-cm
5. MAXIMUM SCREW TORQUE : 2.5kgf-cm

REVISION

| REV	DATE	DESCRIPTION OF REVISION				REASON	CHG'D BY
UNIT	mm	DRA'N BY	DES'D BY	CHK'D BY	APP'D BY	MODEL NAME	LTN121AT06-L01
SCALE	1/1		C.W.LEE				
TOLERANCE			09.05.26			PART/SHEET NAME	OUTLINE DIMENSION	SHEET	1/1
					SPEC. NO		
SAMSUNG ELECTRONICS						CODE NO.		VER.	000

8. PACKING

Preliminary

1. CARTON(Internal Package)

  (1) Packing Form
     Corrugated Cardboard box and EPS form as shock absorber

  (2) Packing Method

CUSHION PAD

PANEL

PACKING CASE

CUSHION PAD
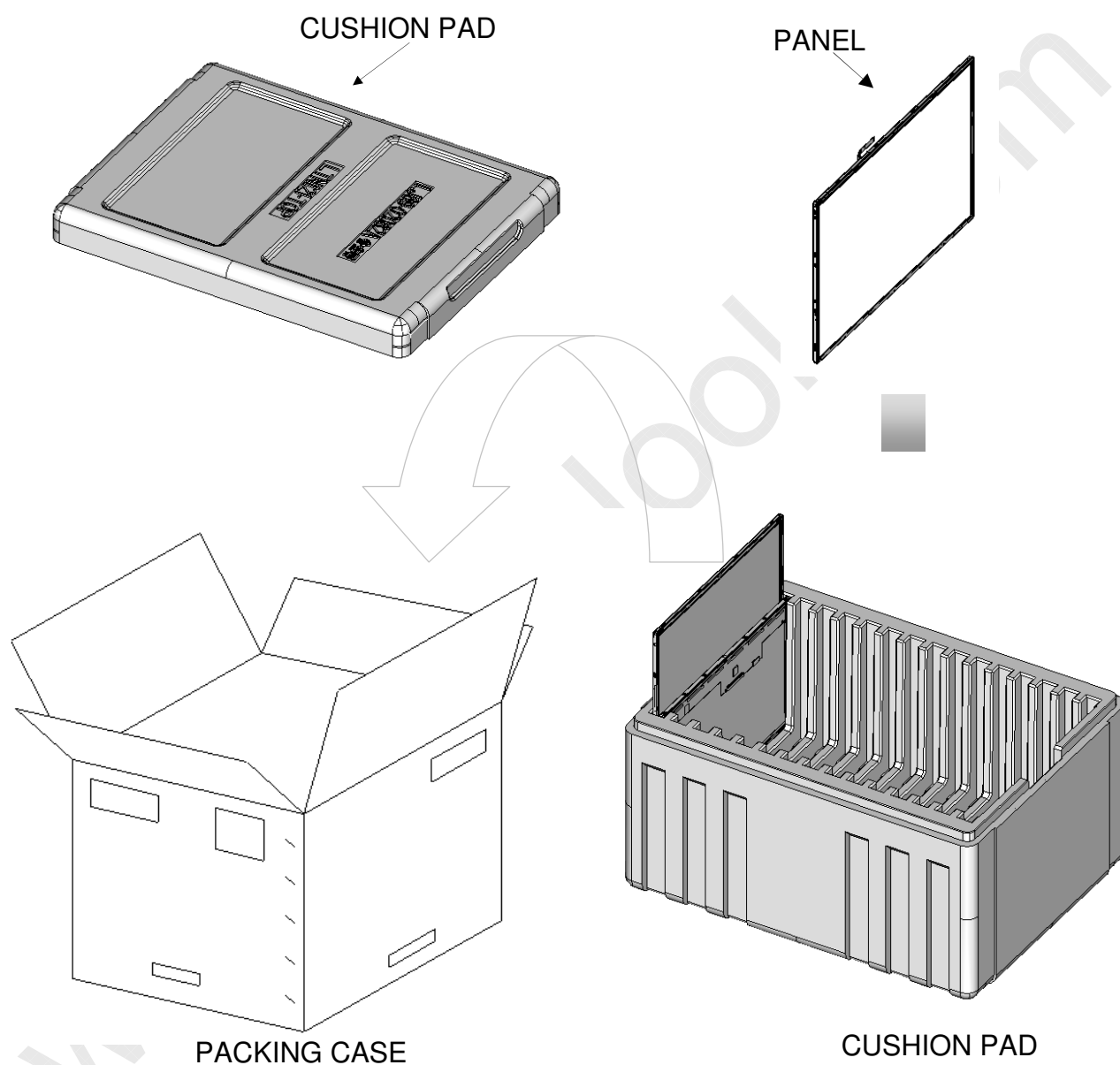
     Note 1)Total Weight : Approximately (7.8) kg
         2) Acceptance number of piling : 30 sets
         3) Carton size : 356(L)*475(W)*278(H)

Samsung Secret

| Doc.No. | LTN121AT06-L02 | **Rev.No** | 04-P00-G-090710 | **Page** | 23 / 27 |

(3)Packing Material

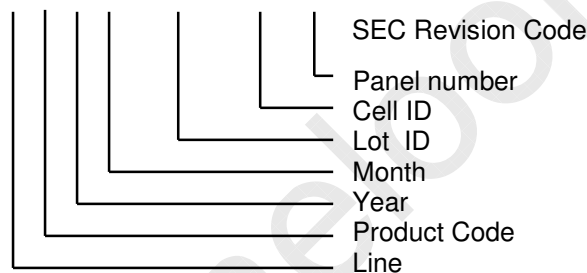| No	Part name	Quantity
1	Static electric protective sack	30
2	Packing case (Inner box) included shock absorber	1 set
3	Pictorial marking	2 pcs
4	Carton	1 set

9. MARKINGS & OTHERS

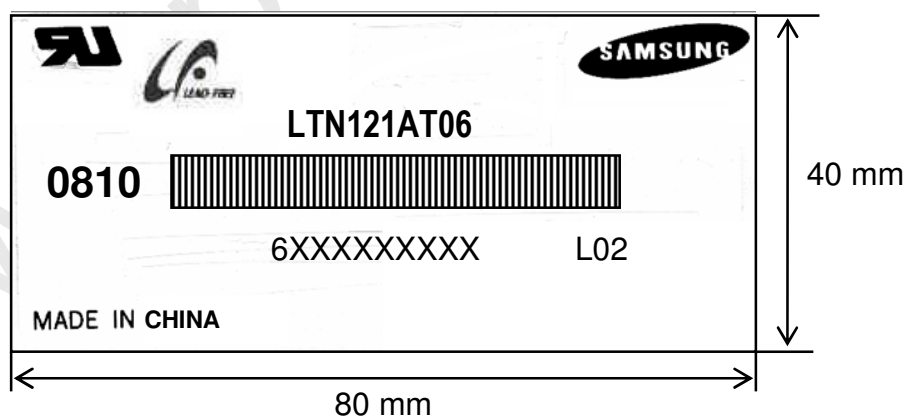A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.

(1)Parts number : LTN121AT06
(2)Revision code : 3 letters
(3)Lot number   : X X X X XXX XX X   **L02**

SEC Revision Code

Panel number
Cell ID
Lot ID
Month
Year
Product Code
Line

(4) Nameplate Indication

LTN121AT06

0810

6XXXXXXXXX   L02
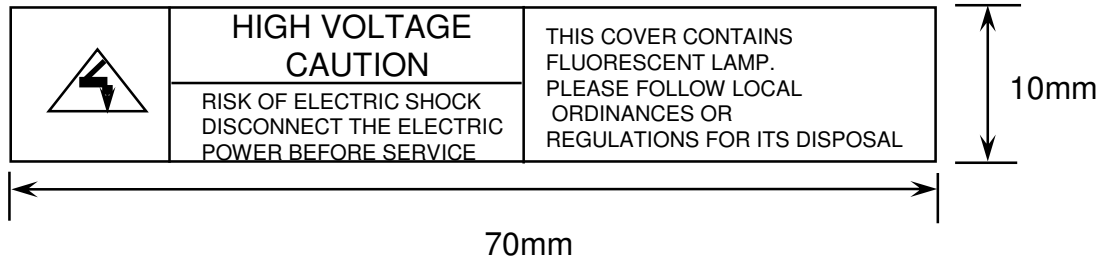
MADE IN CHINA

40 mm

80 mm

Parts name   : LTN121AT06-L02
Lot number   : XXXXXXXXXX
Inspected work week : 0810(2008 year, 10th week)
Product Revision Code : L02
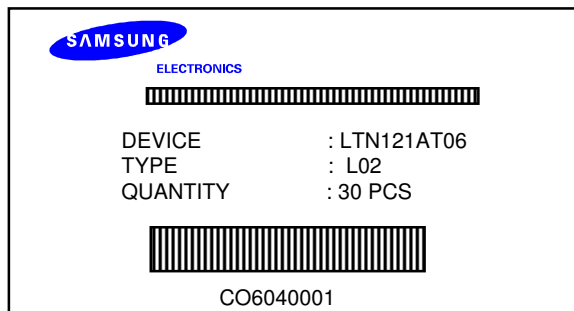Production Site   : CHINA(SESL)

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	24 / 27

(5) High voltage caution notice

	HIGH VOLTAGE CAUTION RISK OF ELECTRIC SHOCK DISCONNECT THE ELECTRIC POWER BEFORE SERVICE	THIS COVER CONTAINS FLUORESCENT LAMP. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS DISPOSAL

10mm

70mm

(6) Packing small box attach

SAMSUNG
ELECTRONICS

DEVICE　　　　: LTN121AT06
TYPE　　　　　: L02
QUANTITY　　　: 30 PCS

CO6040001

(7) Packing box Marking : Samsung TFT-LCD Brand Name

Samsung Secret

Doc.No.	LTN121AT06-L02	**Rev.No**	04-P00-G-090710	**Page**	25 / 27

10. GENERAL PRECAUTIONS

Preliminary

1. Handling

(a) When the module is assembled, It should be attached to the system firmly
using every mounting holes. Be careful not to twist and bend the modules.

(b) Refrain from strong mechanical shock and / or any force to the module. In addition to
damage, this may cause improper operation or damage to the module and CCFT back-light.

(c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch
the surface harder than a HB pencil lead.

(d) Wipe off water droplets or oil immediately. If you leave the droplets for a long time,
Staining and discoloration may occur.

(e) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(f) The desirable cleaners are water, IPA (Isoprophyl Alcohol) or Hexane.
Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl
chloride. It might permanent damage to the polarizer due to chemical reaction.

(g) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or
mouth . In case of contact with hands, legs or clothes, it must be washed away thoroughly
with soap.

(h) Protect the module from static , it may cause damage to the C-MOS Gate Array IC.

(i) Use fingerstalls with soft gloves in order to keep display clean during the incoming
inspection and assembly process.

(j) Do not disassemble the module.

(k) Do not pull or fold the lamp wire.

(l) Do not adjust the variable resistor which is located on the back side.

(m) Protection film for polarizer on the module shall be slowly peeled off just before use so
that the electrostatic charge can be minimized.

(n) Pins of I/F connector shall not be touched directly with bare hands.

Samsung Secret

Doc.No.	LTN121AT06-L02	**Rev.No**	04-P00-G-090710	**Page**	26 / 27

Preliminary

2. STORAGE

(a) Do not leave the module in high temperature, and high humidity for a long time.
   It is highly recommended to store the module with temperature from 0 to 35 ℃ and
   relative humidity of less than 70%.

(b) Do not store the TFT-LCD module in direct sunlight.

(c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent
   light during the store.

3. OPERATION

(a) Do not connect,disconnect the module in the " Power On" condition.

(b) Power supply should always be turned on/off by following item 6.3
   " Power on/off sequence ".

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic
   interference shall be done by system manufacturers. Grounding and shielding methods
   may be important to minimize the interference.

(d) The cable between the back-light connector and its inverter power supply shall be a
   minimized length and be connected directly . The longer cable between the back-light
   and the inverter may cause lower luminance of lamp(CCFT) and may require higher
   startup voltage (Vs).

(e) The standard limited warranty is only applicable when the module is used for general
   notebook applications. If used for purposes other than as specified, SEC is not to be
   held reliable for the defective operations. It is strongly recommended to contact SEC
   to find out fitness for a particular purpose.

4. OTHERS

(a) Ultra-violet ray filter is necessary for outdoor operation.

(b) Avoid condensation of water. It may result in improper operation or disconnection
   of electrode.

(c) Do not exceed the absolute maximum rating value. (the supply voltage variation, input
   voltage variation, variation in part contents and environmental temperature, so on)
   Otherwise the module may be damaged.

(d) If the module displays the same pattern continuously for a long period of time,it can be
   the situation when the image "sticks" to the screen.

(e) This module has its circuitry PCB's on the rear side and should be handled carefully in
   order not to be stressed.

Samsung Secret

| **Doc.No.** | LTN121AT06-L02 | **Rev.No** | 04-P00-G-090710 | **Page** | 27 / 27 |

Preliminary

11. EDID

Address (HEX)	FUNCTION	Value HEX	BIN	DEC	ASCII or Data	Notes
00		00	00000000	0		
01		FF	11111111	255		
02		FF	11111111	255		
03	Header	FF	11111111	255		EDID Header
04		FF	11111111	255		
05		FF	11111111	255		
06		FF	11111111	255		
07		00	00000000	0		
08	ID Manufacturer Name	4C	01001100	76	S E	3 character ID
09		A3	10100011	163	C	"SEC"
0A	ID Product Code	54	01010100	84	[T]	"AT"
0B		47	01000111	71	[G]	"G01"
0C		00	00000000	0		
0D	32-bit serial no.	00	00000000	0		
0E		00	00000000	0		
0F		00	00000000	0		
10	Week of manufacture	00	00000000	0		
11	Year of manufacture	12	00010010	18	2008	2008
12	EDID Structure Ver.	01	00000001	1	1	EDID Ver. 1.0
13	EDID revision #	03	00000011	3	3	EDID Rev. 3
14	Video input definition	80	10000000	128		
15	Max H image size	1A	00011010	26	26	26 cm(approx)
16	Max V image size	10	00010000	16	16	16 cm(approx)
17	Display Gamma	78	01111000	120	2.2	Gamma 2.2
18	Feature support	0A	00001010	10		
19	Red/green low bits	D3	11010011	211		10000111
1A	Blue/white low bits	E5	11100101	229		11111110
1B	Red x/ high bits	95	10010101	149	0.585	Red x 0.580= 10010101
1C	Red y	5C	01011100	92	0.360	Red y 0.360= 01011100
1D	Green x	60	01100000	96	0.375	Green x 0.375= 01100000
1E	Green y	90	10010000	144	0.565	Green y 0.565= 10010000
1F	Blue x	27	00100111	39	0.155	Blue x 0.155= 00100111
20	Blue y	19	00011001	25	0.100	Blue y 0.100= 00011001
21	White x	50	01010000	80	0.313	White x 0.313= 01010000
22	White y	54	01010100	84	0.329	White y 0.329= 01010100
23	Established timing 1	00	00000000	0		
24	Established timing 2	00	00000000	0		
25	Established timing 3	00	00000000	0		

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	28 / 27

Preliminary

26	Standard timing #1	01	00000001	1		not used
27		01	00000001	1		
28	Standard timing #2	01	00000001	1		not used
29		01	00000001	1		
2A	Standard timing #3	01	00000001	1		not used
2B		01	00000001	1		
2C	Standard timing #4	01	00000001	1		not used
2D		01	00000001	1		
2E	Standard timing #5	01	00000001	1		not used
2F		01	00000001	1		
30	Standard timing #6	01	00000001	1		not used
31		01	00000001	1		
32	Standard timing #7	01	00000001	1		not used
33		01	00000001	1		
34	Standard timing #8	01	00000001	1		not used
35		01	00000001	1		
36	Detailed timing/monitor descriptor #1	EE	11101110	238	68.94	Main clock= 68.94 MHz
37		1A	00011010	26		
38		00	00000000	0	1280	Hor active=640*2 pixels
39		80	10000000	128	128	Hor blanking=128 pixels
3A		50	01010000	80		4bit : 4bit
3B		20	00100000	32	800	Vertcal active=800 lines
3C		10	00010000	16	16	Vertical blanking=16 lines
3D		30	00110000	48		4bit : 4bit
3E		10	00010000	16	16	Hor sync. Offset=12 pixels
3F		30	00110000	48	48	H sync. Width=48 pixels
40		33	00110011	51	3 / 3	V sync. Offset=3 lines / V sync. Width=3 lines
41		00	00000000	0		2bit : 2bit :2bit :2bit
42		05	00000101	5	261	H image size= 261 mm(approx)
43		A3	10100011	163	163	V image size = 163mm(approx)
44		10	00010000	16		
45		00	00000000	0		No Horizontal Border
46		00	00000000	0		No Vertical Border
47		19	00011001	25		
48	Detailed timing/monitor descriptor #2	00	00000000	0		Manufacturer Specified (Timing)
49		00	00000000	0		
4A		00	00000000	0		
4B		0F	00001111	15		
4C		00	00000000	0		
4D		00	00000000	0		Value=HSPWmin / 2
4E		00	00000000	0		Value=HSPWmax / 2
4F		00	00000000	0		Value=Thbpmin /2
50		00	00000000	0		Value=Thbpmax /2
51		00	00000000	0		Value=VSPWmin /2
52		00	00000000	0		Value=VSPWmax /2
53		00	00000000	0		Value=Tvbpmin / 2
54		00	00000000	0		Value=Tvbpmax / 2
55		23	00100011	35		Thpmin=value*2 + HA pixelclks
56		87	10000111	135		Thpmax=value*2 + HA pixelclks
57		02	00000010	2		Tvpmin=value*2 + VA lines
58		64	01100100	100		Tvpmax=value*2 + VA lines
59		00	00000000	0		Module revision

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	29 / 27

Preliminary

5A		00	00000000	0		ASCII Data String Tag
5B		00	00000000	0		
5C		00	00000000	0		
5D		FE	11111110	254		
5E		00	00000000	0		
5F		53	01010011	83	[S]	
60		41	01000001	65	[A]	
61	Detailed timing/monitor	4D	01001101	77	[M]	
62	descriptor #3	53	01010011	83	[S]	
63		55	01010101	85	[U]	
64		4E	01001110	78	[N]	
65		47	01000111	71	[G]	
66		0A	00001010	10	[^]	
67		20	00100000	32	[]	
68		20	00100000	32	[]	
69		20	00100000	32	[]	
6A		20	00100000	32	[]	
6B		20	00100000	32	[]	
6C		00	00000000	0		Monitor Name Tag (ASCII)
6D		00	00000000	0		
6E		00	00000000	0		
6F		FE	11111110	254		
70		00	00000000	0		
71		4C	01001100	76	[L]	
72		54	01010100	84	[T]	
73	Detailed timing/monitor	4E	01001110	78	[N]	
74	descriptor #4	31	00110001	49	[1]	
75		32	00110010	50	[2]	
76		31	00110001	49	[1]	
77		41	01000001	65	[A]	
78		54	01010100	84	[T]	
79		30	00110000	48	[0]	
7A		36	00110110	54	[6]	
7B		4C	01001100	76	[L]	
7C		30	00110000	48	[0]	
7D		32	00110010	50	[2]	
7E	Extension Flag	00	00000000	0		
7F	Checksum	23	00100011	35		

Samsung Secret

Doc.No.	LTN121AT06-L02	Rev.No	04-P00-G-090710	Page	30 / 27